

DERWENT-ACC-NO: 1995-171062

DERWENT-WEEK: 199523

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TITLE: Denitrification and desulphurisation of waste gas
esp. from combustion

without evapn. stage - by scrubbing with aq. ammonia
soln., decomposing nitrite

to nitrogen and water and oxidising sulphite to sulphate
with oxygen in gas in

hot zone after separating condensed sulphuric acid

INVENTOR-NAME: REMSTEDT, H

PRIORITY-DATA: 1993DE-4335867 (October 21, 1993)

PATENT-FAMILY:

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ABSTRACTED-PUB-NO: DE 4335867A

BASIC-ABSTRACT: In the conversion of NO_x and SO_x into
harmless waste gas
constituents or crystals for removal of ammonium salts,
the crude waste gas (I)
is freed from H₂SO₄ condensate (II) by cooling.

After cooling to 30-50deg.C, the NO is (partly) oxidised
to NO₂ to improve the
solubility. Removal of (II) and oxidn are carried out in
the presence of an
active compsn.

SO₂ and NO_x are scrubbed out with aq NH₃ soln at 30-
50deg.C in an absorber,
pref. with a dwell of 1-10 s and pH of 6-9. The pretreated
gas enters the hot
zone of the absorber, where (NH₄)₂SO₃ formed by absorption
is oxidised to
(NH₄)₂SO₄ by the O₂ in (I), whilst the dissolved NO_x is
converted to NH₄NO₂,
which is decomposed to N₂ and H₂O in the hot zone, in which
esp. the temp. is
60-90deg.C and dwell 10-120 min. The hot zone is below the
cold zone and the

gas flows upwards, in countercurrent to the soln., so that a temp. and pH zone suitable for absorption, decomposition and oxidn. is obtd. in a suitable position in the absorber.

These processes need not proceed to completion, since they begin again when the absorption soln is recycled. Decomposition of NH_4NO_2 is favoured by the required acid pH by formation of $(\text{NH}_4)_2\text{SO}_4$ from recycled (II) and from oxidn of $(\text{NH}_4)_2\text{SO}_3$.

$(\text{NH}_4)_2\text{SO}_4$ and opt. double ammonium sulphate-nitrate (if NO_2 is present in excess of NO) is pptd. from the circulating soln continuously in a crystalliser and the crystals are sepd. after a dwell of up to 4 hrs., whilst the remaining mother liquor is recycled, esp. after adding fresh NH_3 to convert NH_4HSO_3 to $(\text{NH}_4)_2\text{SO}_3$ for layer absorption and dilute the mother liquor satd with $(\text{NH}_4)_2\text{SO}_4$, so that no crystallisation occurs in the pipe.

The cold purified waste gas is freed from residual NH_3 and give a moisture content higher than the original by scrubbing with (II). To ensure that it takes up a suitable amt. of water, the gas may be heated with warm cooling water, heated by heat exchange with (I), before passing through (II) to the flue.

The amt. and/or rate of circulation is increased to buffer variations in the impurity concn. or amt. of (I) by a corresp. excess of absorption soln.. Automated control is possible.

USE - The process is useful for removing NO_x and SO_x from (I) from combustion.

ADVANTAGE - The process avoids the need for concn. by evapn. to crystallise

salts; uses (II) for removing residual NH₃ or salts; and uses the O₂ in (I) for oxidising SO₂ and NO ; and avoids the need for 100% oxidn. by recycling the absorbent.

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SO₂ and NO_x are scrubbed out with aq NH₃ soln at 30-50deg.C in an absorber, pref. with a dwell of 1-10 s and pH of 6-9. The pretreated gas enters the hot zone of the absorber, where (NH₄)₂SO₃ formed by absorption is oxidised to (NH₄)₂SO₄ by the O₂ in (I), whilst the dissolved NO_x is converted to NH₄NO₂, which is decomposed to N₂ and H₂O in the hot zone, in which esp. the temp. is 60-90deg.C and dwell 10-120 min. The hot zone is below the cold zone and the gas flows upwards, in countercurrent to the soln., so that a temp. and pH zone suitable for absorption, decomposition and oxidn. is obtd. in a suitable position in the absorber.

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The cold purified waste gas is freed from residual NH₃ and give a moisture content higher than the original by scrubbing with (II). To ensure that it takes up a suitable amt. of water, the gas may be heated with warm cooling water, heated by heat exchange with (I), before passing through (II) to the flue.

Basic Abstract Text - ABTX:

ADVANTAGE - The process avoids the need for concn. by evapn. to crystallise salts; uses (II) for removing residual NH₃ or salts; and uses the O₂ in (I) for oxidising SO₂ and NO ; and avoids the need for 100% oxidn. by recycling the absorbent.

Derwent Accession Number - NRAN:

1995-171062

Title - TIX:

Denitrification and desulphurisation of waste gas esp. from
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evapn. stage - by scrubbing with aq. ammonia soln.,
decomposing nitrite to
nitrogen and water and oxidising sulphite to sulphate with
oxygen in gas in hot
zone after separating condensed sulphuric acid

Standard Title Terms - TTX:

DENITRIFICATION DESULPHURISE WASTE GAS COMBUST EVAPORATION
STAGE SCRUB AQUEOUS
AMMONIA SOLUTION DECOMPOSE NITRITE NITROGEN WATER
OXIDATION SULPHITE SULPHATE
OXYGEN GAS HOT ZONE AFTER SEPARATE CONDENSATION SULPHURIC
ACID